

THIS IS A



16+ Channel FULLY ANALOG

VOCODER





The

WAVEFRONT-AUDIO Vocoder

is a sixteen channel Vocoder

comprising a sixteen channel analyzer and a sixteen channel synthesizer section for the transfer of the overtone structure of sounds entered into the Voice Input, onto the sounds entered into the Carrier Input. The frequency range of these sixteen channels extend from 50 Hz to 5080 Hz. They are indicated on the front panel between the row of output jacks for the control voltages derived in the analyzer channels, and the row of input jacks leading to the voltage controlled amplifiers in the synthesizer channels. The performance of these 16 channels is further enhanced by

a high frequency channel extending from 5080 Hz to 15000 Hz which mainly covers the region of "s" sounds and explosive consonants, and which can be operated in the "direct" mode, in which it functions as a bypass, or in the "switched" mode, in which it is only activated in the presence "s" sounds and consonants, or completely switched-off.

The availability of this high frequency enhancement channel has proven extremely useful for the processing or "copying" of percussive sounds entered into the Voice Input, such as violin pizzicato, drum sounds, bell sounds and the like, and thus places this into a completely new category of instruments in its class.

The faithful transfer of attack transients is furthermore facilitated by the fast response times of the control circuits in the analyzer section, which is in the order of 5 milliseconds.

SIXTEEN CHANNEL SPECTRAL VOCODER

SPECIFICATIONS

Max. Gain 50dB

Total Harmonic Distortion THD 1kHz/20kHz

0dB gain = 0,0005%

50dB gain = 0,005%

Reference Input Impedance 10 kOhm

Differential Input Impedance 10 MOhm

Output Impedance 200 Ohm

Carrier Input Impedance 100 KOhm

Max. Gain 10/1 loaded

Noise ratio better then 90 dB bypass mode

85 dB in Vocoder mode

Frequency Range:

Overall: 50-15,000 Hz

Vocoding Section: 50-5,080 Hz

The

SPECIAL FEATURES

of the WAVEFRONT_AUDIO VOCODER include the following:

1. The analyzer control outputs are directly connected (internally) to the control inputs of the VCA's of the synthesizer section. If external patch cords are used, these connections can be opened and a free patch mode is possible to generate special effects (such as the "Donald Duck" effect).
2. A sample/hold control, holding a given sound spectrum (for instance a vowel or an instrument sound) entered into the Voice Input when actuating a push button or using the foot switch jack on the front panel.
3. A Vocoder bypass, either activated by a rocker switch or a foot switch jack on the front panel.
4. Variable "Threshold" adjustment for extended operation of Voiced/Unvoiced switching levels.
5. Audio modifier (Bass/Treble) for incoming voice signals.
6. Extended output jacks for Voiced/Unvoiced combined, modified audio out, a gate output signal when unvoiced is activated for controlling or triggering other devices.
7. A build-in pink noise source and a voice activated switching circuit to enter the carrier signal into the synthesizer section in the presence of voiced sounds, and the noise signal in the presence of unvoiced sounds. External input for unvoiced signals is available.
8. 16 channel LED indicators (Level indicator for the amplifier control inputs).

Other features and controls include:

- Input sensitivity switch (Gain up to 40 dB)
- Voice level and carrier level overload indicators
- Voiced and unvoiced active indicators.
- Mode switch for selecting the switched or the direct bypass mode of the 5080 to 15000 Hz range or switch off the channel.
- Voice/Unvoiced balance control for properly balancing, and
- Unvoiced / Unvoiced+Voiced / Voiced mode switch to activate either the unvoiced sounds alone, or the entire vocoder range, or the voiced sounds alone. The voiced mode is important for the processing of specific musical sounds.

Control Voltage Outputs (Analyzer and Rectifier section)

Control Voltage adjustment (10/1 max) for each channel

Control Voltage Indicators for each channel

Voiced/Unvoiced Indicators

Voice/Program input jack

Carrier input jack

Bypass foot switch

Ext. Unvoiced Source input jack

SIXTEEN CHANNEL SPECTRAL VOCODER



ANALYSER CONTROL OUTPUTS

SYNTHESIZER CONTROL INPUTS

ON
OFF



Voice/Programm Input Gain Control (max. 50dB)

Gain Overload Indicator

Audio Modifiers (Bass + Treble)

Carrier Input Gain Control (max. 10/1)

ON/OFF switch for 5.080 to 15.000Hz channel

Voiced/Unvoiced Filter Matrix (Threshold shift control)

Voiced/Unvoiced Filter Matrix "ON or fixed" switch

Voiced/Unvoiced mix section

Hold Control Voltage push bottom and foot switch

Voice/Program bypass to output switch

Voiced/Unvoiced direct Audio Out

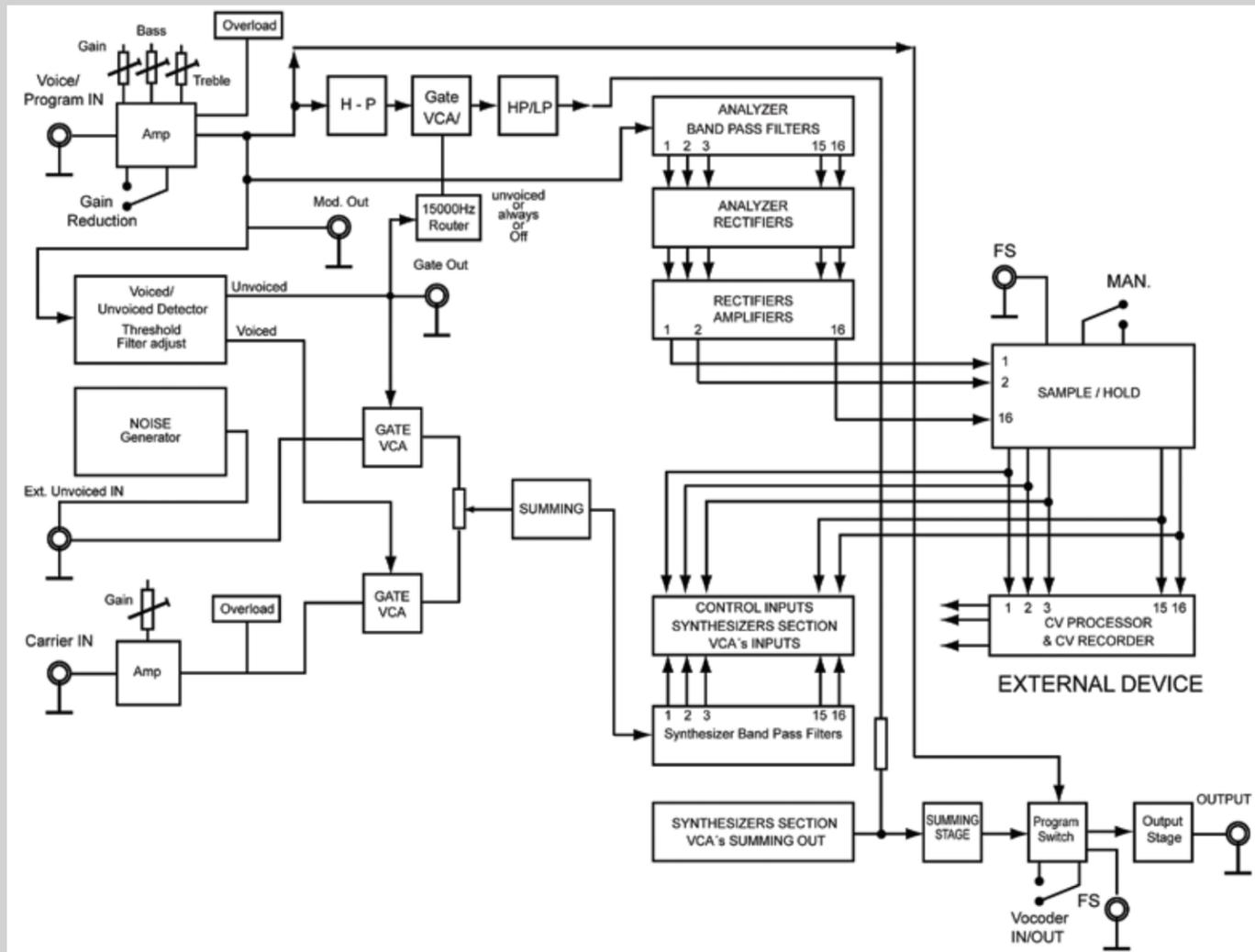
Audio modifier out

Gate out (5V max.) when Unvoiced is detected

VOCODER or bypass signal Output

WAVEFRONT_AUDIO VOCODER

SIGNAL FLOW

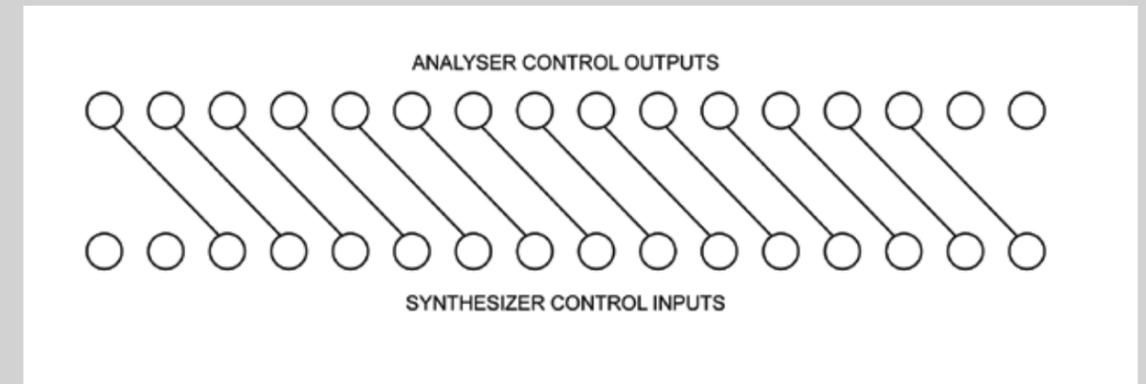


WAVEFRONT_AUDIO VOCODER

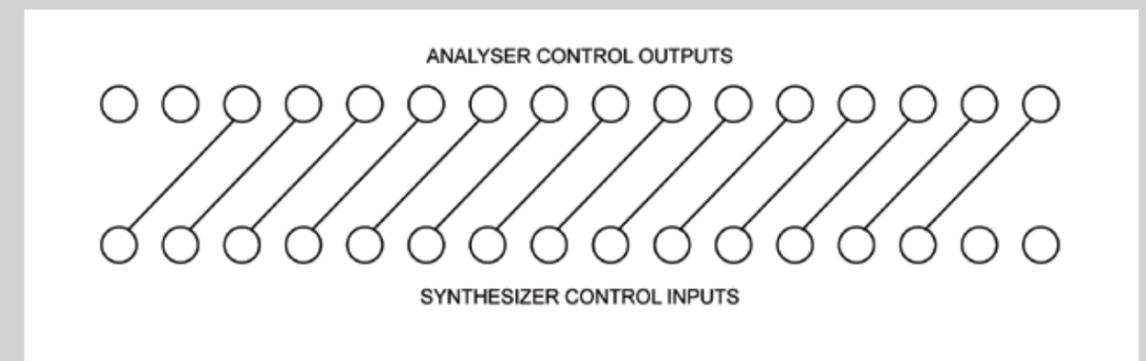
PATCH SHEETS

without external Channel Manager

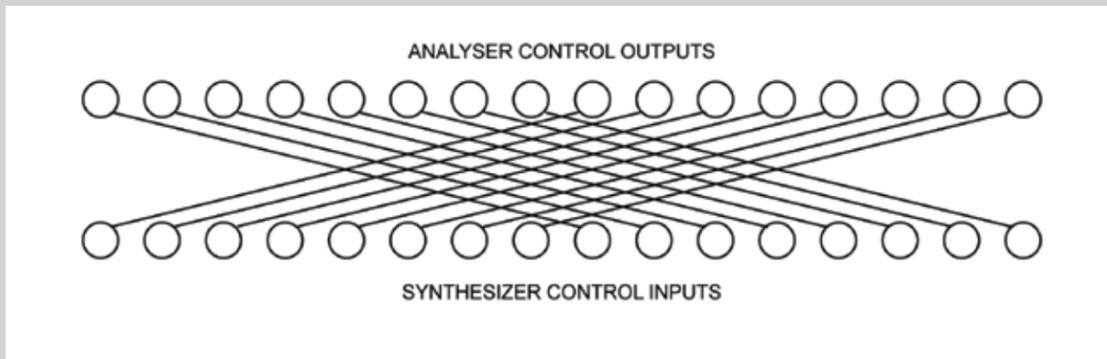
2-step left-to-right diagonal patch, produces **raising** of speech formants, such as it happens in the "Donald Duck" effect:



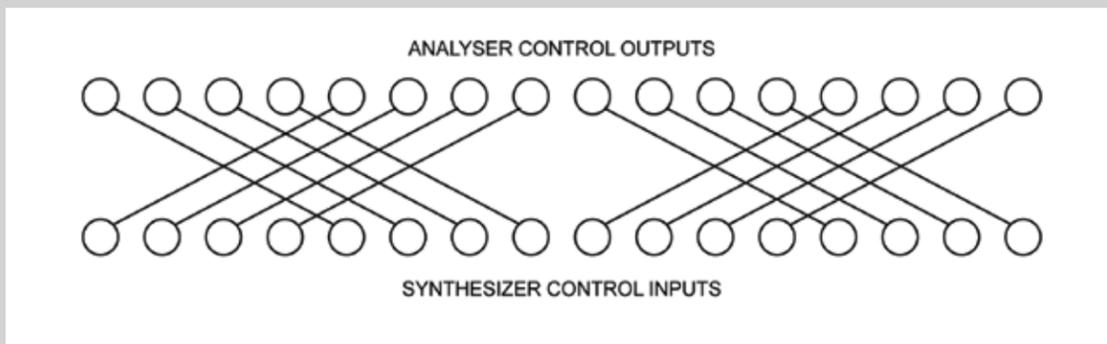
2-step right-to-left diagonal patch, produces **lowering** of speech formants:



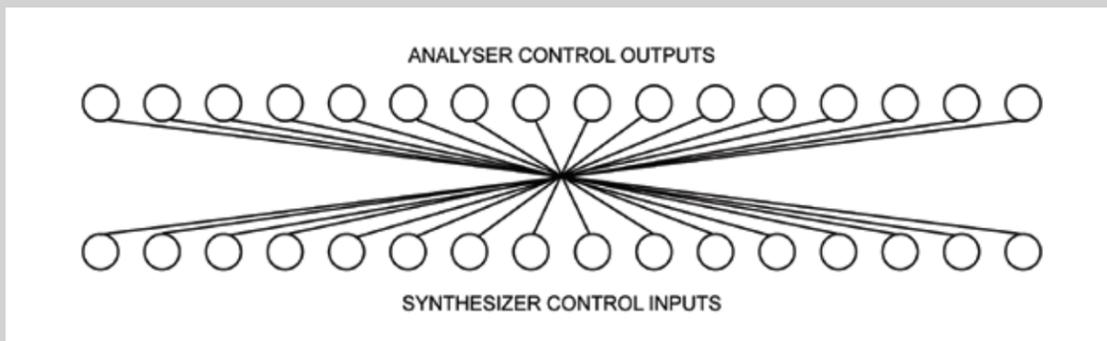
Single cluster X-patch, produces speech scrambling close to instrumental sound:



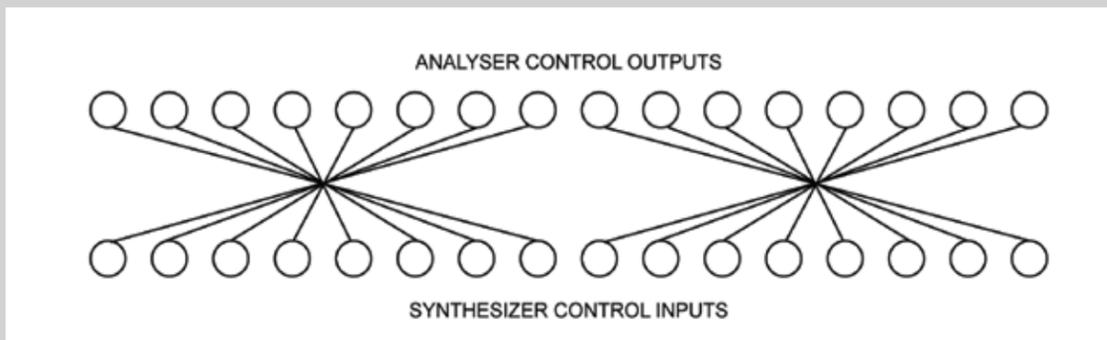
Double cluster X-patch, modification of the one above:



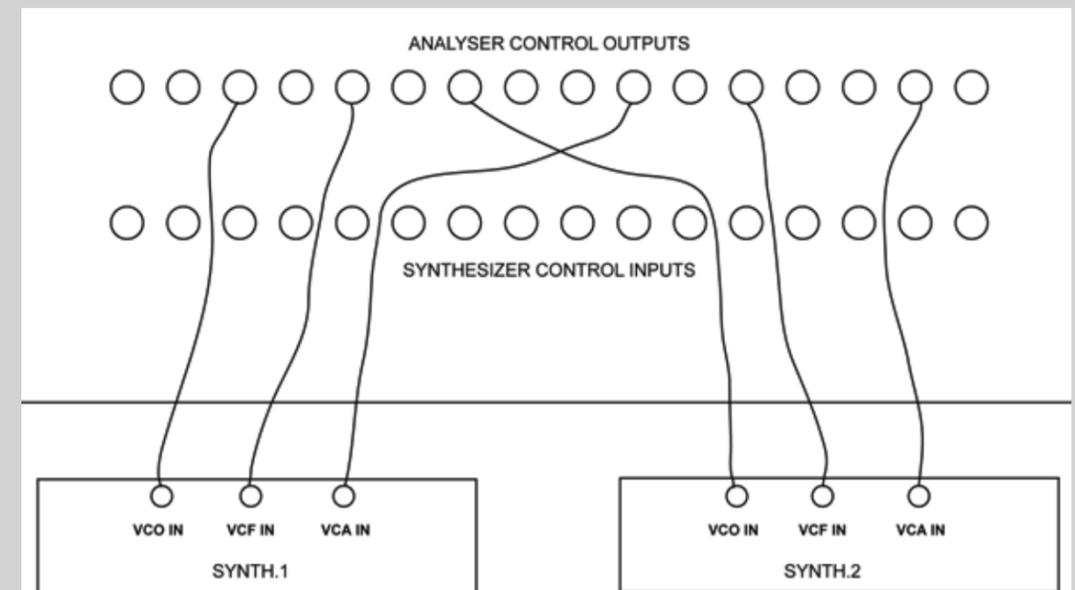
Single cluster inverter:



Double cluster inverter:



Example: Connection with external gear

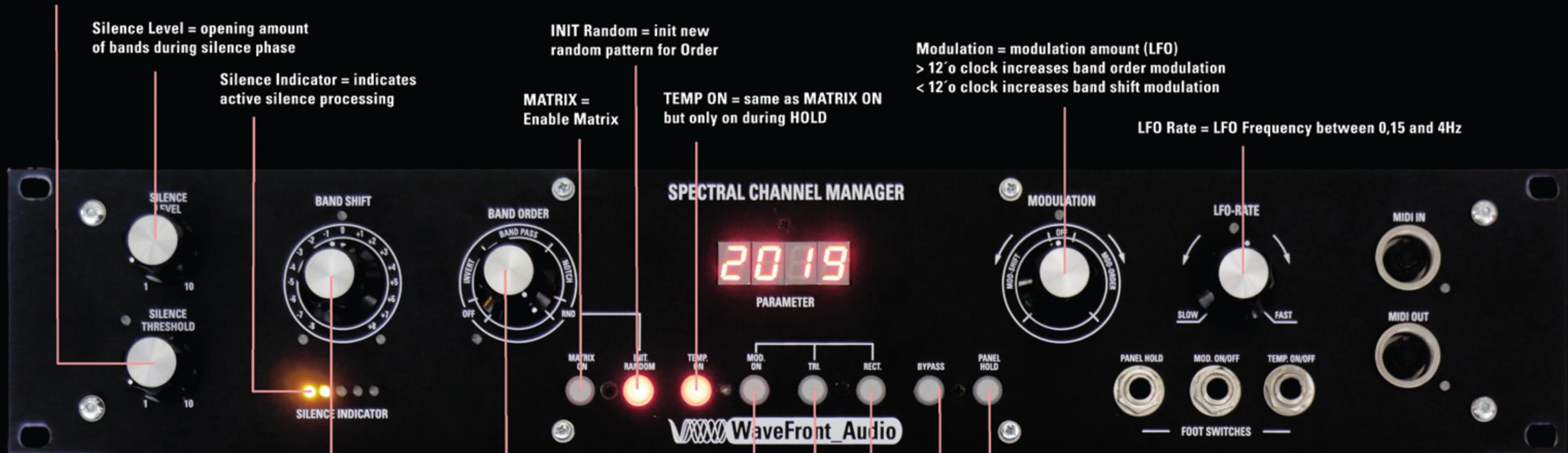


With optional

SPECTRAL CHANNEL MANAGER:



Silence Threshold = sets level where silence attack and decay take place



Silence Level = opening amount of bands during silence phase

Silence Indicator = indicates active silence processing

INIT Random = init new random pattern for Order

MATRIX = Enable Matrix

TEMP ON = same as MATRIX ON but only on during HOLD

Modulation = modulation amount (LFO)
> 12'o clock increases band order modulation
< 12'o clock increases band shift modulation

LFO Rate = LFO Frequency between 0,15 and 4Hz

Band shift = shifts input against output patch right or left (0 = middle zero)

Band order = sets different channel patches

MOD ON = MOD ON/OFF

RECT = LFO Rectangle

TRI = LFO Triangle

BYPASS = MATRIX OFF (HOLD 1 second for true bypass)

PANEL HOLD = when ON, changes on panel have no effect, when OFF changes take place

Basic

SETTINGS AND USER MANUAL

of the SPECTRAL CHANNEL MANAGER

After **POWER ON** the BYPASS LED will be ON.

This means, that NO processing is active and all bands go through 1:1.

Connect the SCM to the vocoder with 2 flat cables and the power supply (12V).

The SCM should boot now and show some messages, that is in detail:

(some characters can't be displayed, so a typical 7-segment substitute is shown instead)

UFCM (Wavefront Channel Manager)
2019 (year – LEDS are flashing))
r1.50 (firmware revision currently typical 1.50)
J01 message about an internal jumper setting – can be ignored by user)
mc 1 (MIDI channel – typically 1 – can be changed during operation)
t569 (can be any of LP, 180, 226, 284, 358, 452, 569, 717, 904, 1.13, 1.43,
1.80, 2.27, 3.61, 4.55, HP) This is the source frequency band for
the silence bridging.

SCM is ready for use now

Insert jacks into the vocoder to produce a typical sound, i.e. voice, carrier and connect the output to an amplifier

– turn **BAND-SHIFT** knob to 12'o clock (middle LED goes ON)

– turn **BAND-ORDER** knob fully CCW (LED NORMAL goes ON)

– turn **MOD-AMOUNT** knob to 12'o clock (middle LED goes ON)

Press **MATRIX ON** - there should be no change in sound. Now you can try the **SHIFT** pot. This will shift the input bands against the output bands. Move the pot carefully to check out the changes. Now turn back the SHIFT to 12'o clock.

Move the **ORDER** pot to the next setting, that is „INV 2“. This inverts 8 groups of 2 – the order is now 2-1-4-3-6-5-8-7-10-9-12-11-14-13-16-15. You will recognize a change in sound – the voice becomes less understandable.

Description of the different groups of band orders

(in the addendum the exact tables are listed)

NORM = 1:1

INV 2, INV 4, INV 8, INV 16 are groups of inverted bands. The INV 16 mirrors the complete order.

BANDPASS:

BP 6, BP 4, BP 2, BP 1 are Bandpass settings, where 6,5,2 or 1 band in the middle are open, whereas the rest is muted. The SHIFT pot moves the filter window over the range where all channels are connected to their own output (1->1, 2->2.....16->16). Moving the SHIFT pot resembles a sweep filter function.

NOTCH:

This is the inverted function of the BANDPASS, where 6,4,2 or 1 are muted while the rest is open.

Please note, that the SHIFT POT has two different modes depending on the order selection. In orders, where all 16 bands are used (NORM, INV, RANDOM) , the SHIFT POT shifts inputs against outputs (patch change).

In all BANDPASS and NOTCH orders, the SHIFT POT moves the filter window and does not change the patch (always 1:1).

INIT-RND:

This setting is rather unpredictable and is for experimental purpose. Re-pressing the INIT-RND button will load a new random pattern – 32 in all. The SHIFT pot adds even more confusion to it.

MODULATION:

BAND-SHIFT and BAND-ORDER can be modulated, i.e. shifted periodically by a Low Frequency Oscillator (LFO). To activate modulation 1st press MOD. Now you can turn the MOD-AMOUNT pot to the left (SHIFT-MOD) or to the right (ORDER-MOD). The RATE pot will set the LFO to any frequency between 0.05 and 4.13Hz – which is displayed while turning. The TRI and SQU buttons set the LFO to a triangle or square waveform. The MOD-ON can also be done by a footswitch connected to the MOD-ON/OFF jack.

The **TEMP-ON** button and jack will temporarily activate the **MATRIX-ON** function.

The **PANEL-HOLD** button and jack will allow to preset front panel changes that don't take effect until this function is cleared.

The **BYPASS** button has two functions. Shortly pressed once result in a soft bypass. If held more than 1 second, the SCM goes into a hard bypass which will completely disconnect the SCM from the vocoder. This mode is indicated by a blinking **BYPASS-LED**.

SILENCE BRIDGING

In some arrangements it may be useful to have the carrier sound through in vocal pauses. The **SILENCE BRIDGING** has to be activated for this. There are two pots on the left side of the SCM. First of all, the silence channel has to be set to a typical MID-band, e.g. 596Hz or 717Hz. See the description below how to do it. The LED-Bar bottom left shows the action on the selected channel. Now turn up the **POT SILENCE-LEVEL** to at least half. Now adjust the **SILENCE-THRESHOLD** in a way that the bridging only comes up under the level you wish. If done so, you can now adjust the **SILENCE-LEVEL** to a desired value.

SUB-FUNCTIONS

These functions are activated by pressing and holding a button more than 1 second (the settings are stored permanently after a change).

INIT-RND = SILENCE CHANNEL -1

MOD = SILENCE CHANNEL +1

TRI = MIDI-CHANNEL -1

SQU = MIDI-CHANNEL +1

MIDI-IMPLEMENTATION

When connected to a MIDI-Keyboard, all channels can be muted or forced full open when pressing certain keys. Please make sure that the **SCM MIDI** channel is the same like the one sent from the keyboard. This option is the last process in the signal chain and overrides panel settings.

There are two basic key-note functions – **MUTE** and **FORCE**.

While **MUTE** suppresses a specific channel – **FORCE** opens it fully and independantly

from that input.

The midi note 36 (C) **MUTES ALL** channels. Pressing keys in the **MUTE** section will **UNMUTE** that channel.

The midi note 38 (C) **FORCES ALL** channels **FULL ON**. Pressing keys in the **FORCE** section will **UNFORCE** that channel.

The **FORCE** option overrides the MUTE option.

The **MODULATION WHEEL** (CC-1) controls the SHIFT-MODULATION amount.

The **PITCH-WHEEL** controls the SHIFT with zero in middle position.

List of MIDI Controllers

CC-#	Function	VALUE
CC- 1	modwheel	0-127=SHIFT MOD-AMOUNT
CC-14	muteall	127=ON
CC-68	bypass	127=ON
CC-69	active	127=ON
CC-66	temp	127=ON
CC-67	panhold	127=ON
CC-70	random	127=ON
CC-71	bandorder	0-127=BAND ORDER
CC-72	bandshift	0-127=BAND SHIFT
CC-73	modamt	60-67 = MOD-AMOUNT OFF 68-127 = ORDER MOD-AMOUNT 59-0 = SHIFT MOD-AMOUNT
CC-74	lfofreq	0-127 LFO FREQ 0.05-4.13Hz
CC-75	modonff	0=MOD OFF , 127=MOD ON
CC-76	lfowave	0-63=TRIANGLE 64=127=SQUARE
CC-78	setsiln	SET SILENCE BRIDGING BAND 00-07 = LP 08-15 = 180 16-23 = 226 24-31 = 284 32-39 = 358 40-47 = 452 48-55 = 569 56-63 = 717 64-71 = 904 72-79 = 1.13 80-87 = 1.43 88-95 = 1.80 96-103 = 2.27 104-111 = 3.61 112-119 = 4.55 120-127 = HP

For detailed informations about the band orders and MIDI-notes please refer to:

*WAVEFRONT SCM
Band Order Tabs and
MIDI overview.pdf*

download at
wavefront-audio.com



16+ Channel ANALOG VOCODER plus additional SPECTRAL CHANNEL MANGER



wavefront-audio.com

wavefront-audio.com

cluboftheknobs.com

aion-modular.com

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